Fig.1

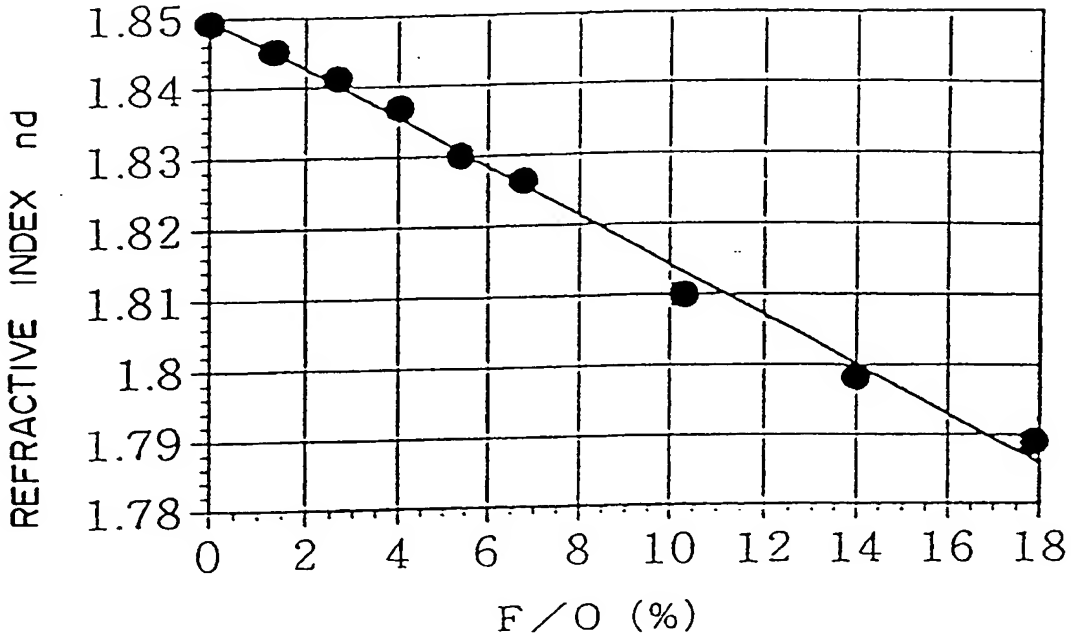
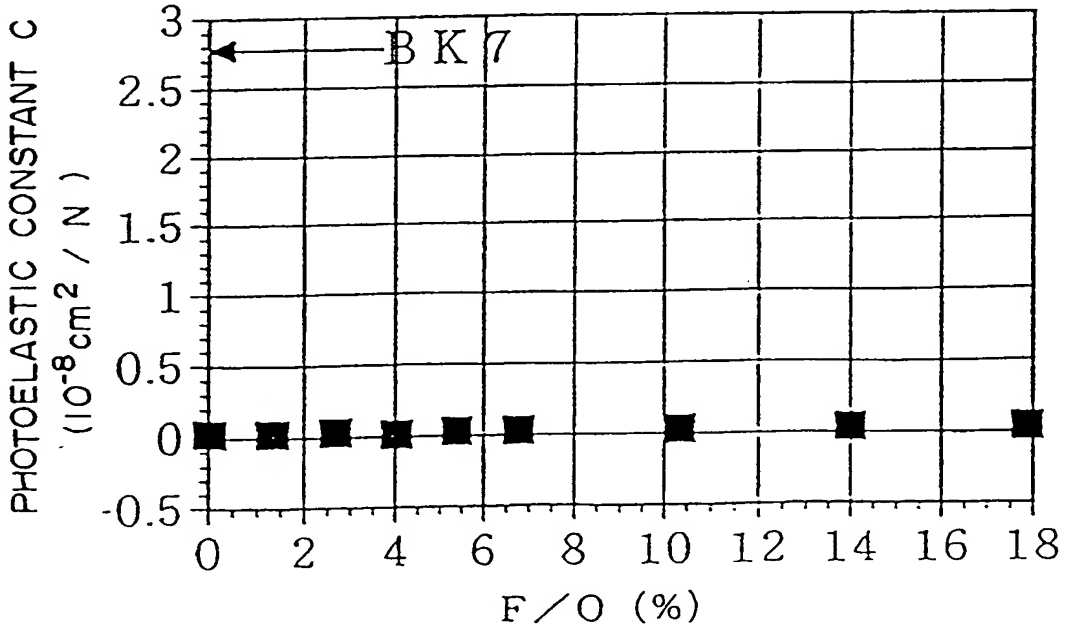
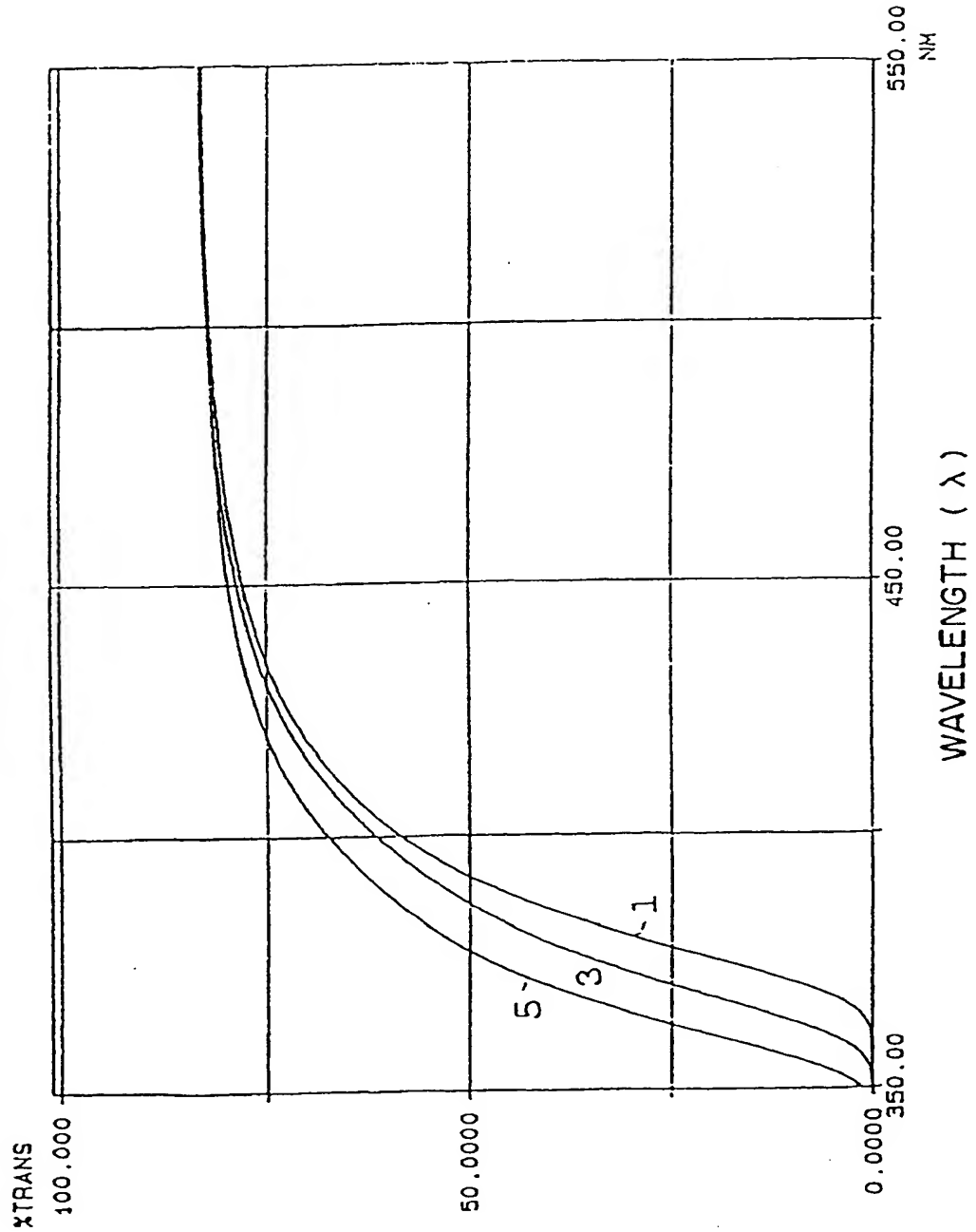

REFRACTIVE INDEX nd
1.85
1.84
1.83
1.82
1.81
1.8
1.79
1.78
0
2
4
6
8
10
12
14
16
18
F/O (%)

Fig.2

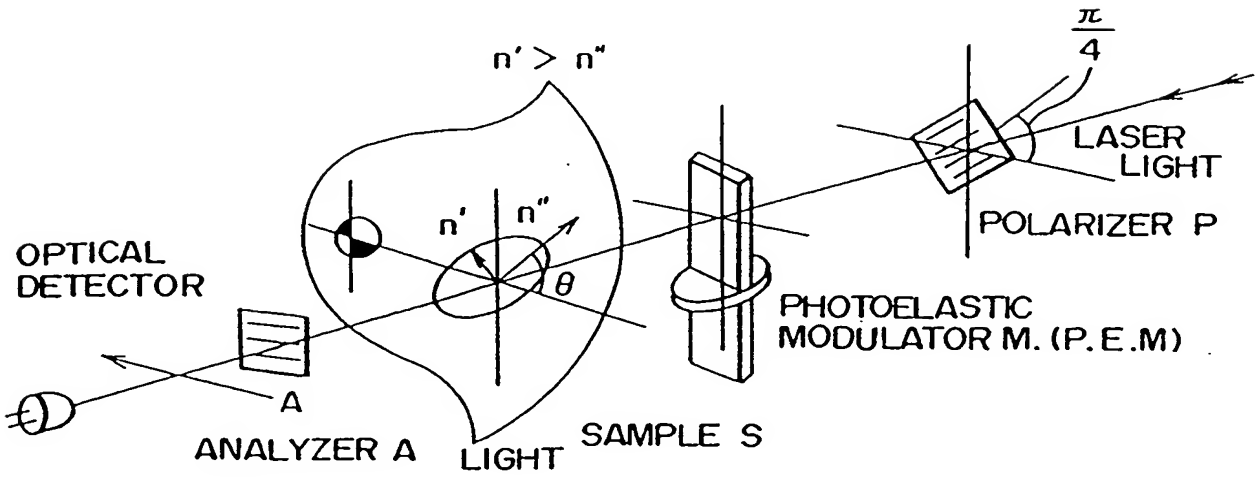

PHOTOELASTIC CONSTANT C
(10-8cm2 / N)
BK7
3
2.5
2
1.5
1
0.5
0
-0.5
0
2
4
6
8
10
12
14
16
18
F/O (%)



TRANSMITTANCE AT DEPTH OF 10mm

Fig.3

Fig.4



ARRANGEMENT OF OPTICAL ELEMENTS

Fig.5

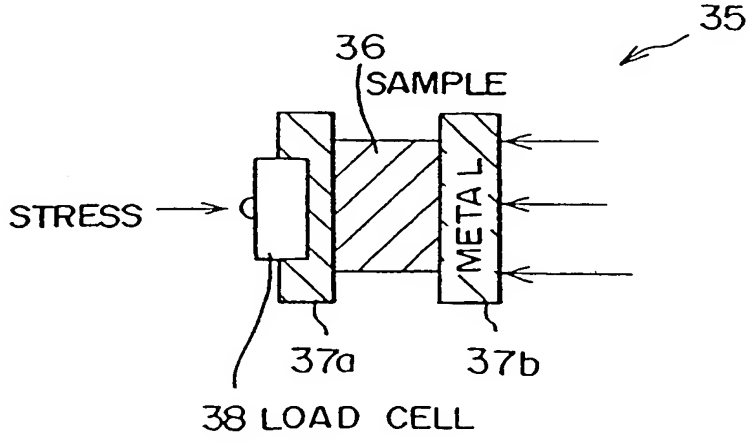


Fig.6

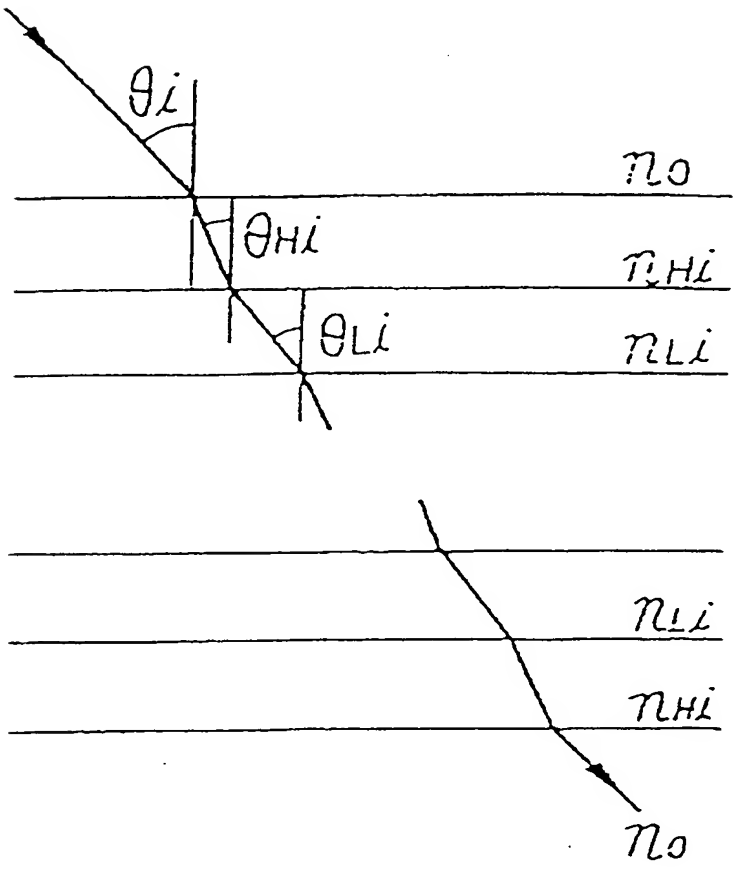
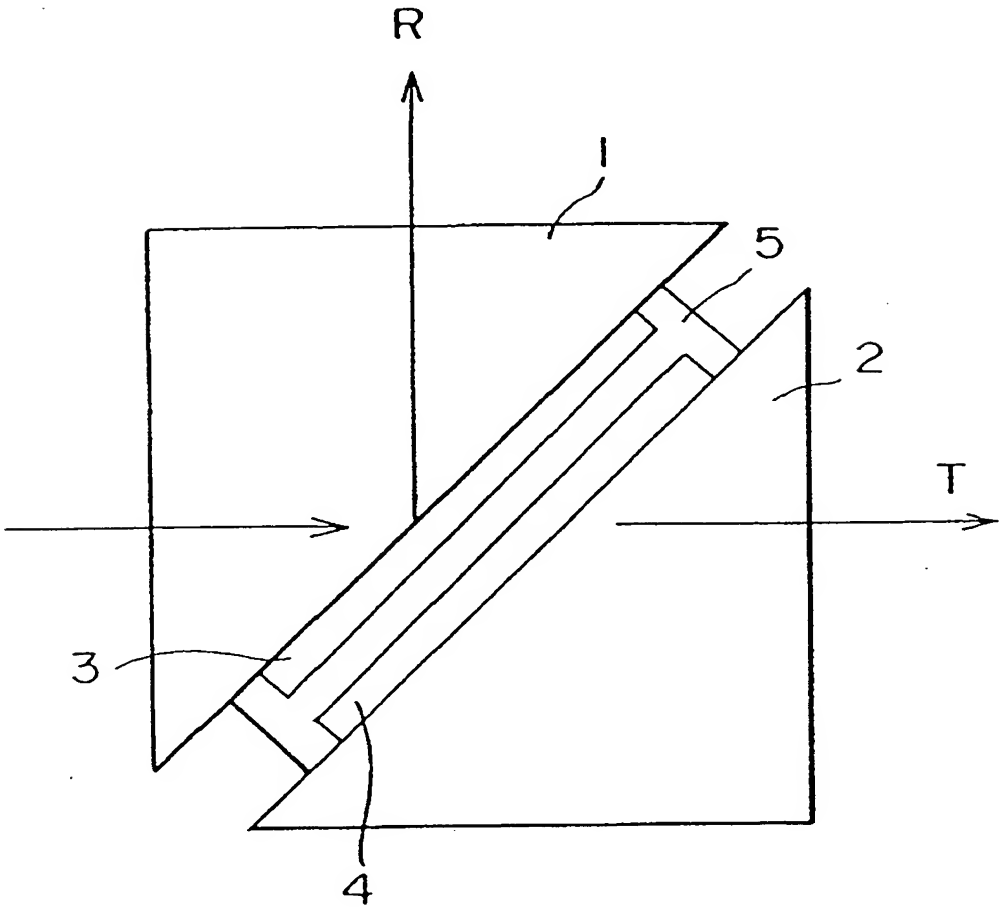
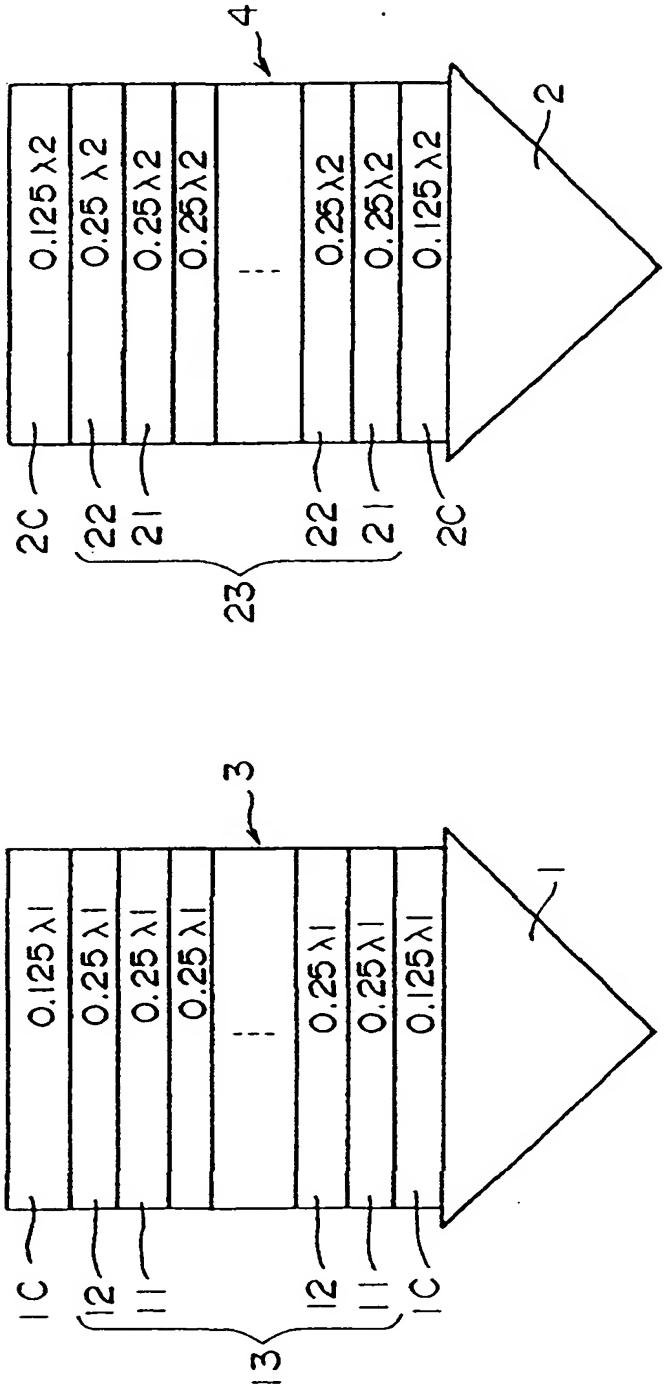


Fig.7




4
2
0.125λ2
0.25λ2
0.25λ2
0.25λ2

0.25λ2
0.25λ2
0.125λ2
2C
22
21
22
21
2C
23
3
1
0.125λ1
0.25λ1
0.25λ1
0.25λ1

0.25λ1
0.25λ1
0.125λ1
1C
12
11
12
11
1C
13

Fig.8

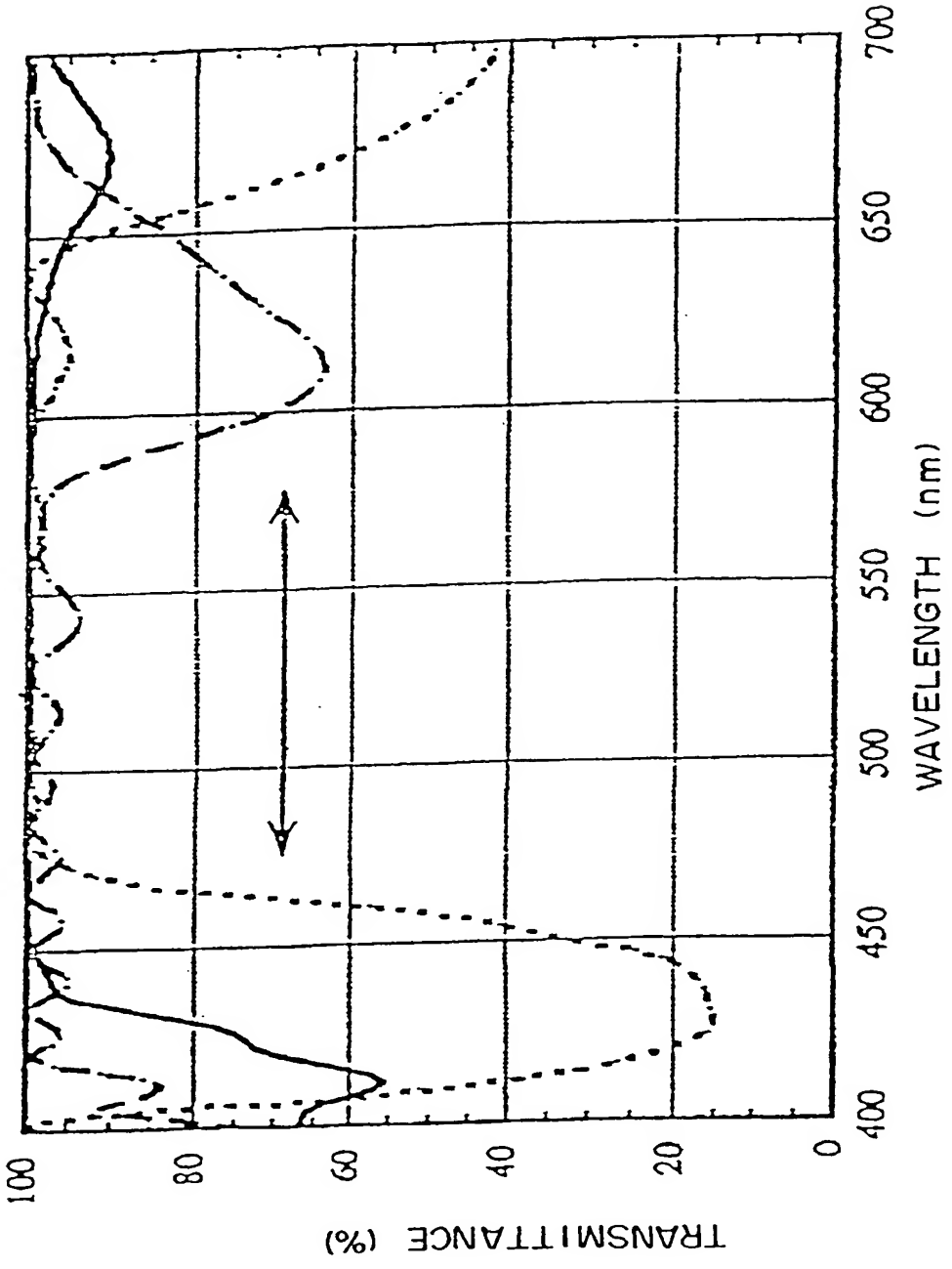

TRANSMITTANCE (%)
100
80
60
40
20
0
400
450
500
550
600
650
700
WAVELENGTH (nm)

Fig.9

Fig.10

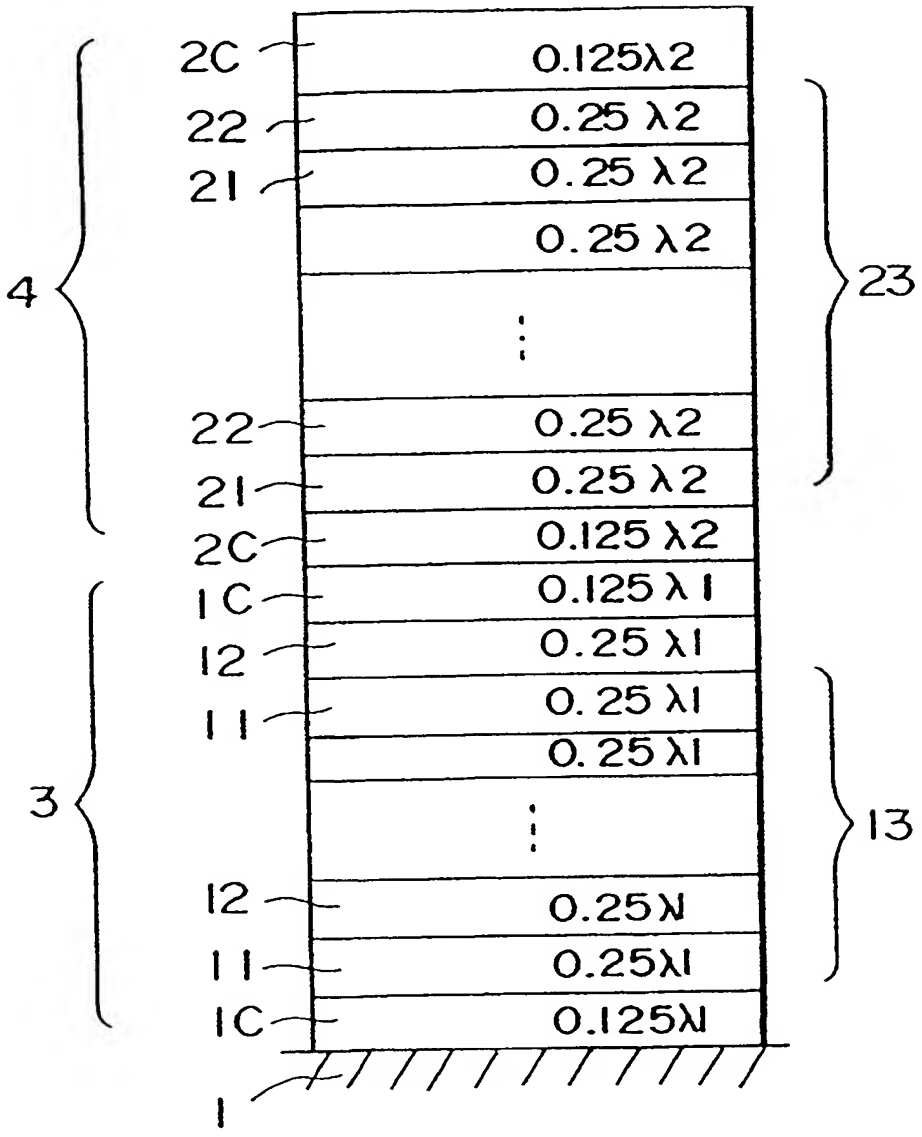
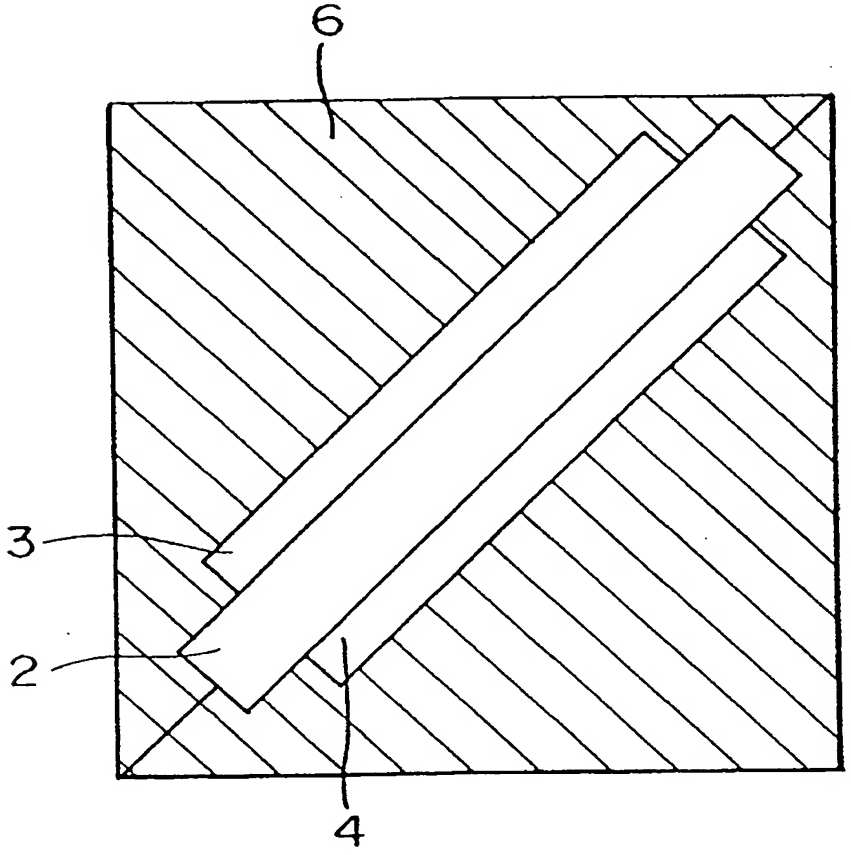

2C
0.125λ2
22
0.25 λ2
21
0.25 λ2
0.25 λ2
4
23
22
0.25 λ2
21
0.25 λ2
2C
0.125 λ2
1C
0.125 λ1
12
0.25 λ1
11
0.25 λ1
0.25 λ1
3
13
12
0.25λ
11
0.25λ1
1C
0.125λ1
1

Fig.11



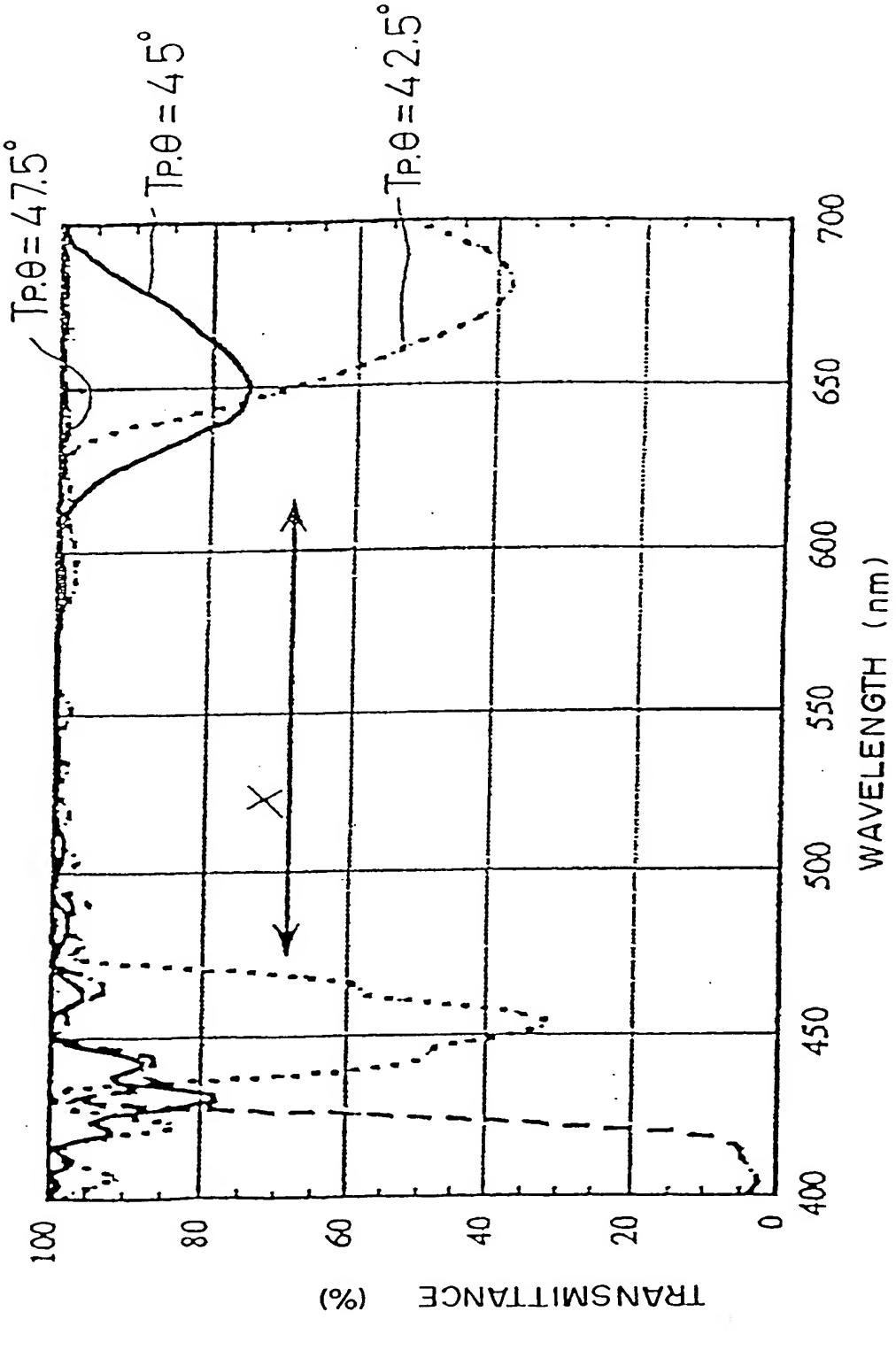

Tp.θ=47.5°
Tp.θ=45°
Tp.θ=42.5°
X
TRANSMITTANCE (%)
100
80
60
40
20
0
400
450
500
550
600
650
700
WAVELENGTH (nm)

Fig.12

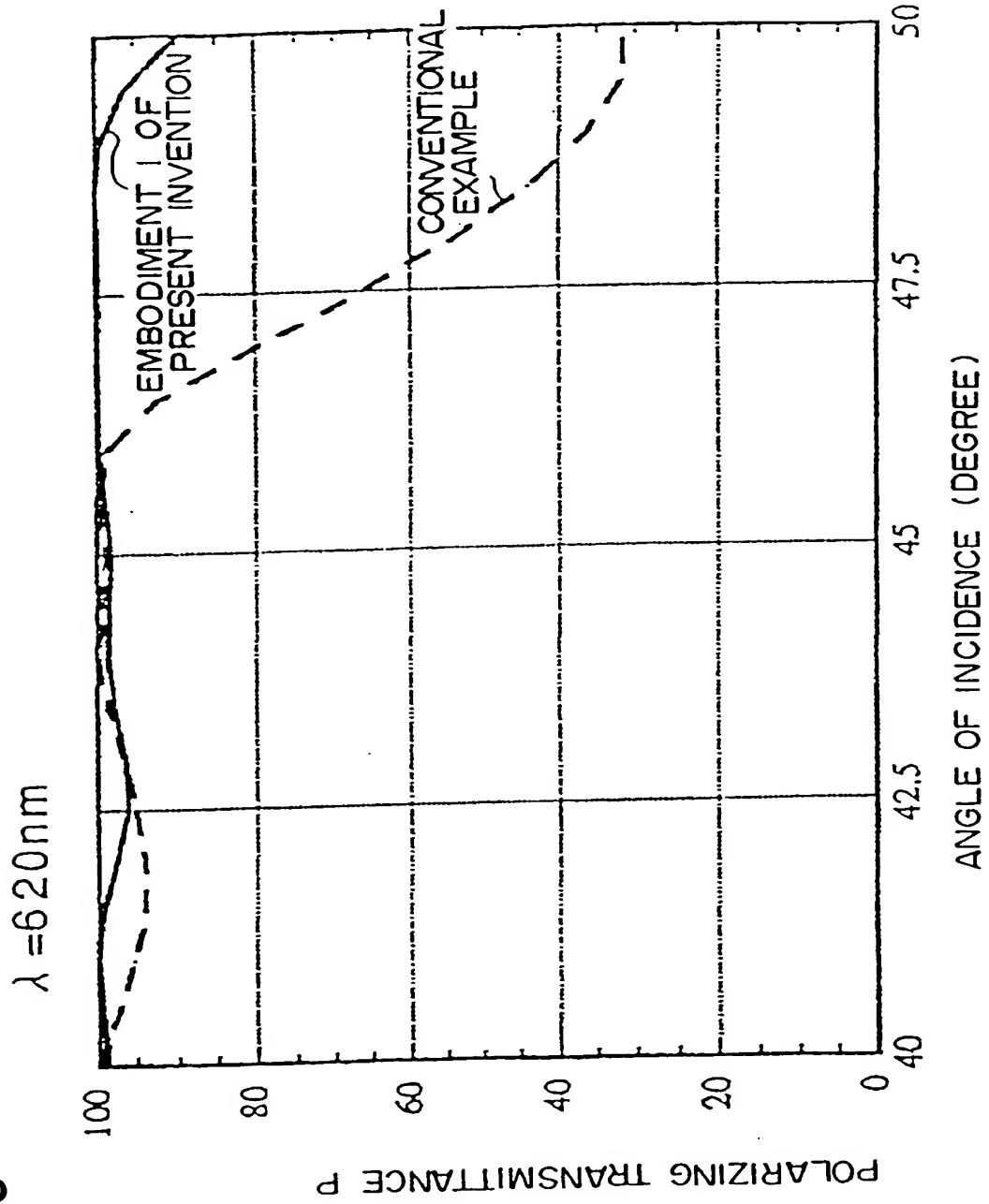

EMBODIMENT 1 OF PRESENT INVENTION
CONVENTIONAL EXAMPLE
λ =620nm
POLARIZING TRANSMITTANCE P
100
80
60
40
20
0
40
42.5
45
47.5
50
ANGLE OF INCIDENCE (DEGREE)

Fig.13

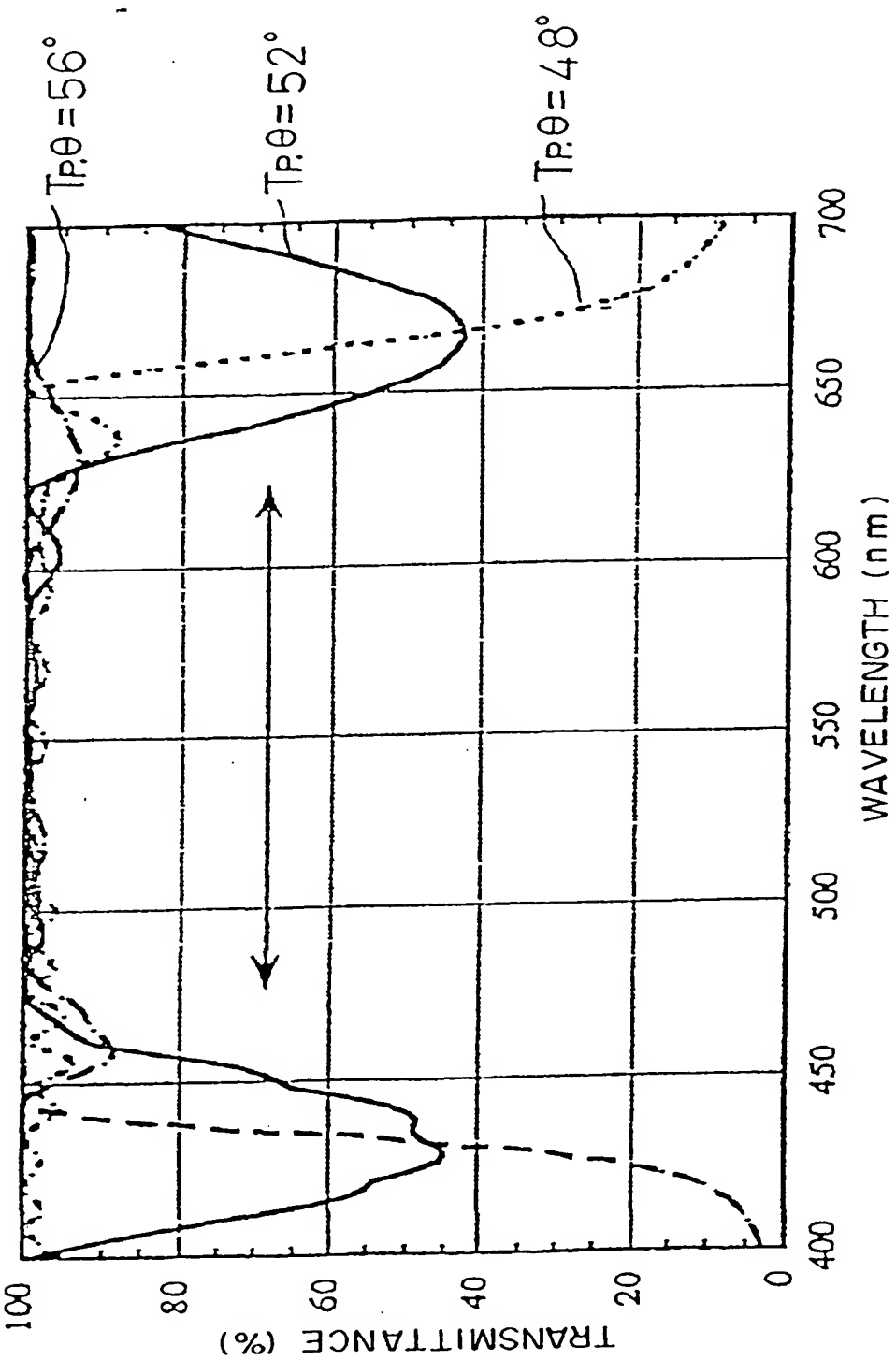

Tp:θ=56°
Tp:θ=52°
Tp:θ=48°
TRANSMITTANCE (%)
100
80
60
40
20
0
400
450
500
550
600
650
700
WAVELENGTH (nm)

Fig.14

Fig.15

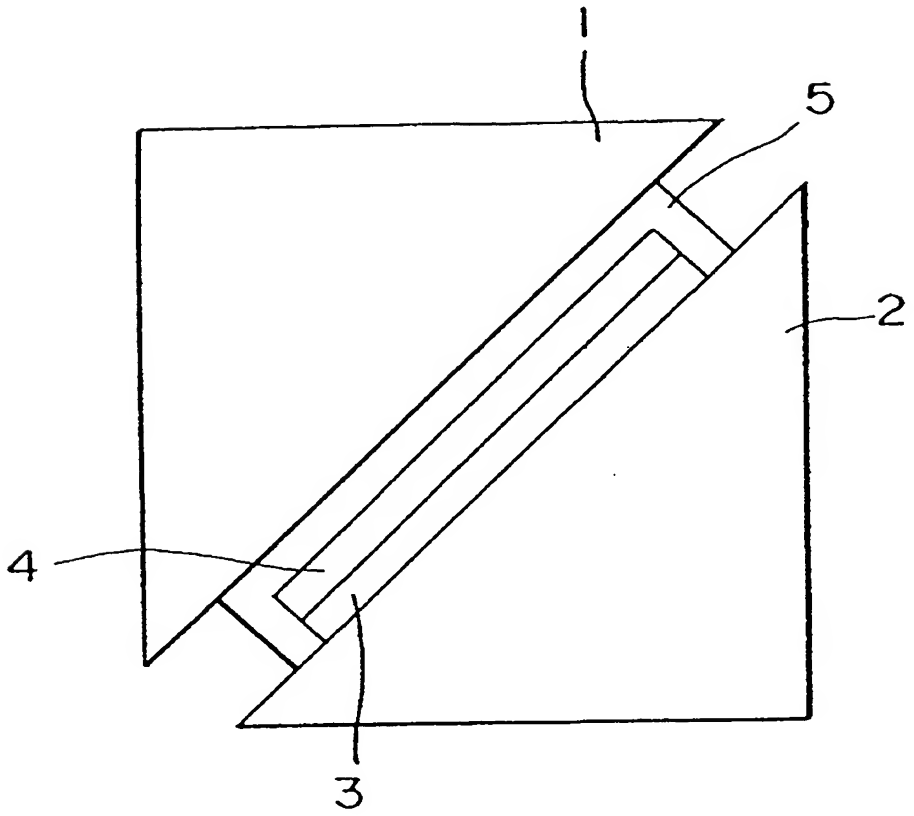


Fig.16
(Table 1)

LIST OF EXAMPLES (mol%、wt%)

No.	1		2		3		4	
	mol%	wt%	mol%	wt%	mol%	wt%	mol%	wt%
SiO_2	52.7	23.9	52.7	23.8	52.7	23.8	52.7	23.8
Na_2O	1.9	0.9	1.9	0.9	1.9	0.9	1.9	0.9
K_2O	1.3	0.9	1.3	0.9	1.3	0.9	1.3	0.9
PbO	43.9	74.0	42.9	72.2	41.9	70.4	40.9	68.6
PbF_2	—	—	1.0	1.9	2.0	3.7	3.0	5.5
Sb_2O_3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3
K_2SiF_6	—	—	—	—	—	—	—	—
F/O (%)	—		1.31		2.65		4.00	
PHOTOELASTIC CONSTANT ($10^{-8}cm^2/N$)	+0.02		+0.02		+0.03		+0.01	
REFRACTIVE INDEX nd	1.849		1.845		1.841		1.837	
WAVELENGTH CORR. TO TRANSMITTANCE OF 80% (nm)	416		411		408		404	

Fig.17
(Table 2)

LIST OF EXAMPLES (mol%、wt%)

No.	5		6		7		8	
	mol%	wt%	mol%	wt%	mol%	wt%	mol%	wt%
SiO_2	52.7	23.8	52.7	23.7	52.7	23.6	52.7	23.5
Na_2O	1.9	0.9	1.9	0.9	1.9	0.9	1.9	0.9
K_2O	1.3	0.9	1.3	0.9	1.3	0.9	1.3	0.9
PbO	39.9	66.8	38.9	65.0	36.4	60.6	33.9	56.2
PbF_2	4.0	7.3	5.0	9.2	7.5	13.7	10.0	18.2
Sb_2O_3	0.2	0.3	0.2	0.3	0.2	0.3	0.2	0.3
K_2SiF_6	—	—	—	—	—	—	—	—
F/O (%)	5.37		6.75		10.30		13.98	
PHOTOELASTIC CONSTANT ($10^{-8}cm^2/N$)	+0.03		+0.03		+0.03		+0.04	
REFRACTIVE INDEX nd	1.830		1.826		1.810		1.798	
WAVELENGTH CORR. TO TRANSMITTANCE OF 80% (nm)	399		394		391		388	

Fig.18 (Table 3)

LIST OF EXAMPLES (mol%、wt%)

No.	9		10		11		12	
	mol%	wt%	mol%	wt%	mol%	wt%	mol%	wt%
SiO_2	52.1	23.2	52.1	22.9	52.1	22.9	45.7	19.0
Na_2O	2.0	0.9	2.0	0.9	2.0	0.9	2.0	0.9
K_2O	—	—	—	—	—	—	2.0	1.3
PbO	44.3	73.2	38.2	62.5	35.7	58.1	45.5	70.4
PbF_2	0.2	0.3	6.3	11.3	8.8	15.7	—	—
Sb_2O_3	0.1	0.3	0.1	0.3	0.1	0.3	1.5	3.1
K_2SiF_6	1.3	2.1	1.3	2.1	1.3	2.1	3.3	5.3
F/O (%)	5.44		14.10		17.86		13.62	
PHOTOELASTIC CONSTANT ($10^{-8}cm^2/N$)	+0.03		+0.04		+0.04		+0.03	
REFRACTIVE INDEX nd	1.830		1.798		1.789		1.810	
WAVELENGTH CORR. TO TRANSMITTANCE OF 80% (nm)	398		386		380		390	

Fig.19
(Table 4)

LIST OF EXAMPLES (mol%、wt%)

No.	13		14	
	mol%	wt%	mol%	wt%
SiO_2	45.2	19.8	40.0	17.5
Na_2O	5.1	2.3	0.5	0.2
K_2O	3.8	2.6	—	—
KF	—	—	15.6	10.7
PbO	40.3	65.4	41.4	67.5
PbF_2	4.2	7.5	2.5	4.1
Sb_2O_3	0.1	0.3	—	—
K_2SiF_6	1.3	2.1	—	—
F／O (%)	11.58		16.90	
PHOTOELASTIC CONSTANT ($10^{-8}cm^2/N$)	+0.04		+0.04	
REFRACTIVE INDEX nd	1.814		1.748	
WAVELENGTH CORR. TO TRANSMITTANCE OF 80% (nm)	410		396	

Fig.20
(Table 5)

No.	21	22	23	24
REFRACTIVE INDEX	1.8223	1.8301	1.8360	1.8426
	25	26	27	BK 7
	1.8501	1.8570	1.8637	1.5168

Fig.21
(Table 6)

No.	22	25	BK7
STRESS (N/cm^2)	31.5	31.0	30.0
DEGREE OF BIREFRINGENCE (nm/cm)	9.45	0.31	83.4

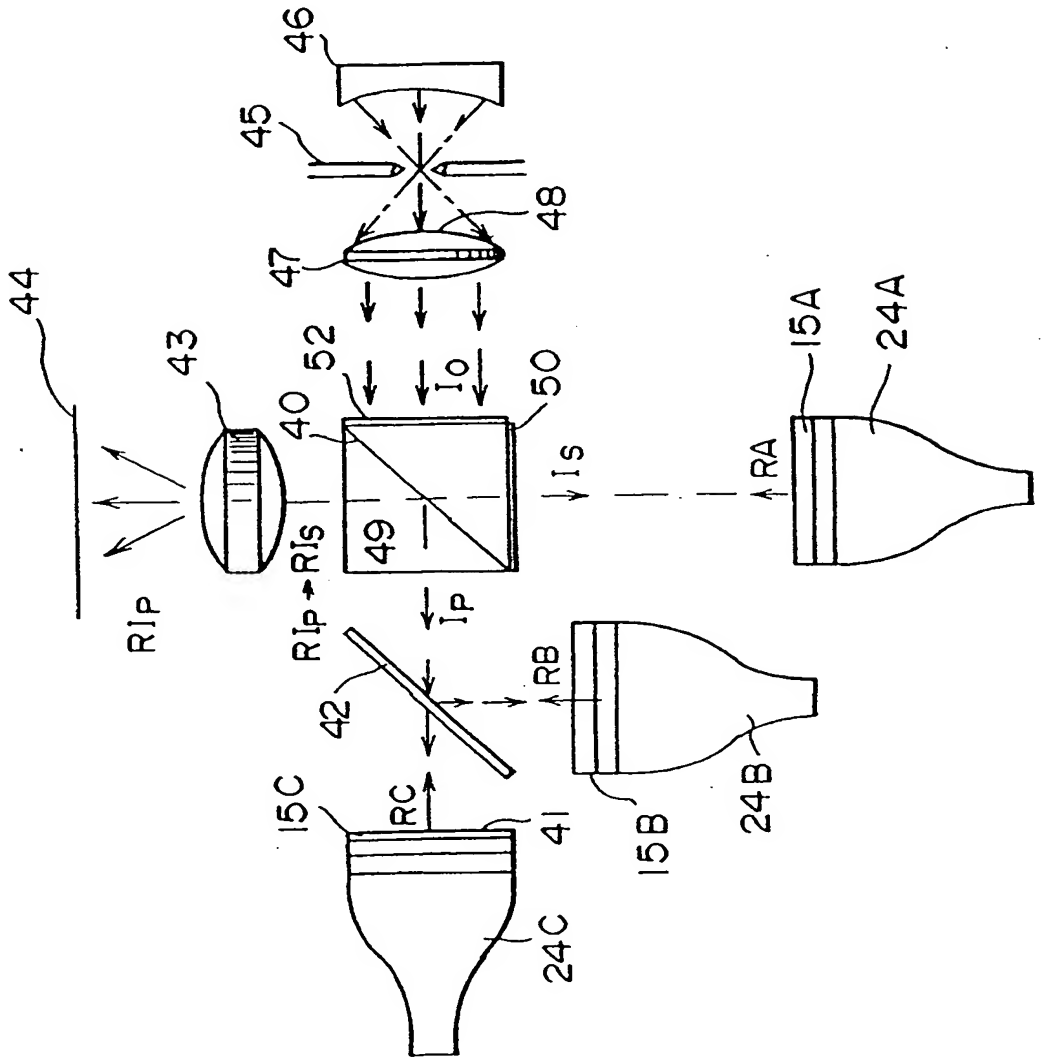

46
45
48
47
44
43
52
Io
50
40
15A
24A
Is
RA
RIs
49
RIp
Ip
RIp
RB
42
15C
RC
41
15B
24B
24C

Fig.22

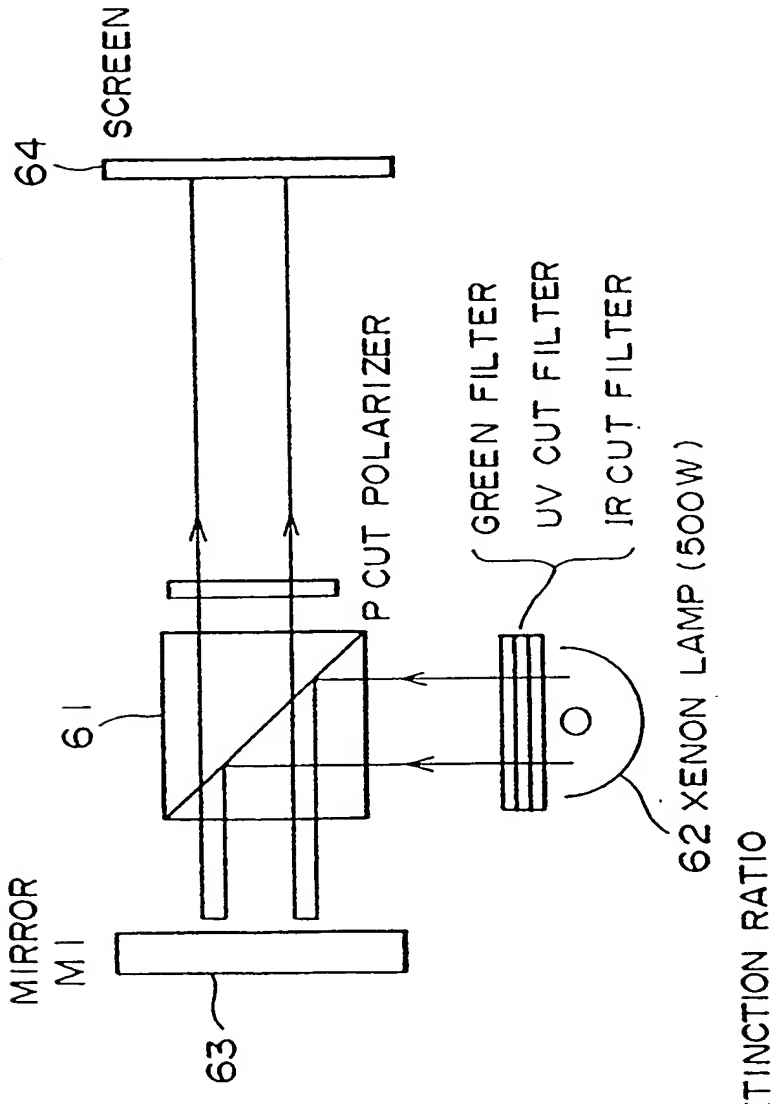


Fig.23

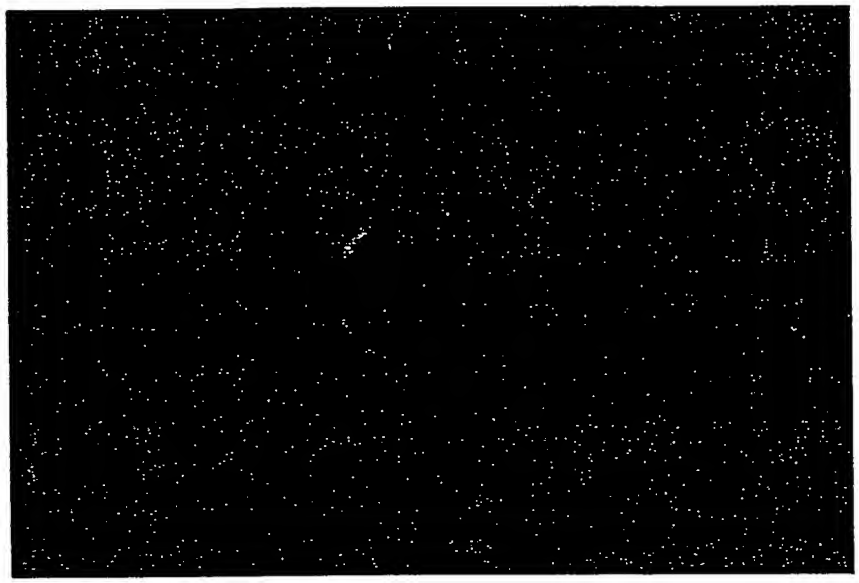
EXTINCTION RATIO

AVERAGE DATA WITH THE WAVELENGTH OF 480-610nm AND
THE INCIDENT ANGLE OF 0,+6,-6 DEGREES

TRANSMISSION : $T_P >= 80\%$, $T_S <= 0.02\%$ EXT. RATIO > 4000

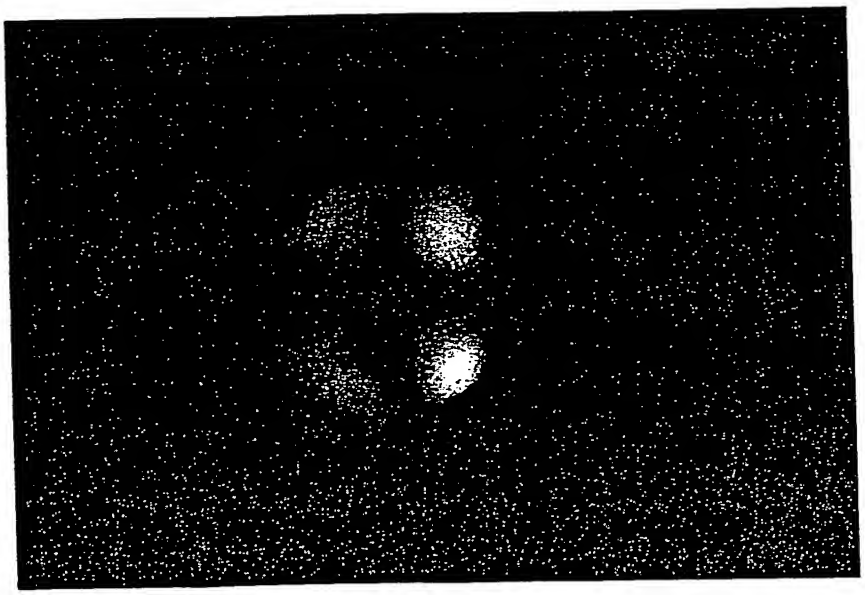
REFLECTION : $R_S >= 80\%$, $R_P <= 4\%$ EXT. RATIO > 20

Fig.24



NEW P B S (DISCERNIBLE SHAPE IS GHOST IMAGE)

Fig.25



CONVENTIONAL - TYPE P B S

Fig.26 (Table 7)

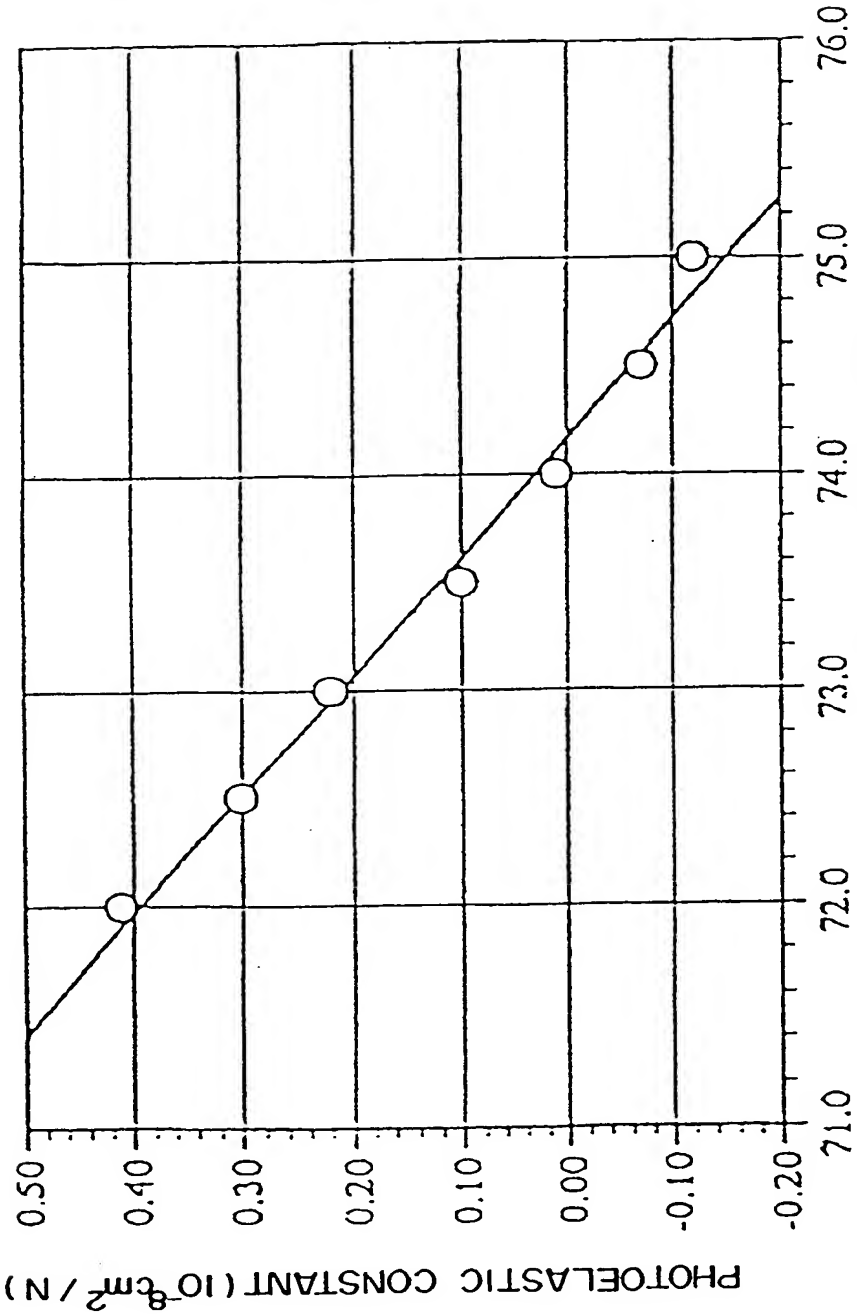
LIST OF EXAMPLES (wt%)

No.	21	22	23	24
SiO_2	25.9	25.4	24.9	24.4
B_2O_3	—	—	—	—
Na_2O	0.9	0.9	0.9	0.9
K_2O	0.9	0.9	0.9	0.9
BaO	—	—	—	—
PbO	72.0	72.5	73.0	73.5
As_2O_3	—	—	—	—
Sb_2O_3	0.3	0.3	0.3	0.3
PHOTOELASTIC CONSTANT ($10^{-8}cm^2/N$)	0.41	0.30	0.22	0.10
LINEAR EXPANSION COEFFICIENT ($10^{-7}/K^{-1}$)	88	90	91	91

Fig.27 (Table 8)

LIST OF EXAMPLES (wt%) cont.

番 号	25	26	27	BK7
SiO_2	23.9	23.4	22.9	68.9
B_2O_3	—	—	—	10.1
Na_2O	0.9	0.9	0.9	8.8
K_2O	0.9	0.9	0.9	8.4
BaO	—	—	—	2.8
PbO	74.0	74.5	75.0	—
As_2O_3	—	—	—	1.0
Sb_2O_3	0.3	0.3	0.3	—
PHOTOELASTIC CONSTANT ($10^{-8}cm^2/N$)	0.01	−0.07	−0.12	2.78
LINEAR EXPANSION COEFFICIENT ($10^{-7}/K^{-1}$)	93	93	94	83



CORRELATION BETWEEN LEAD OXIDE AND PHOTOELASTIC CONSTANT

Fig.28

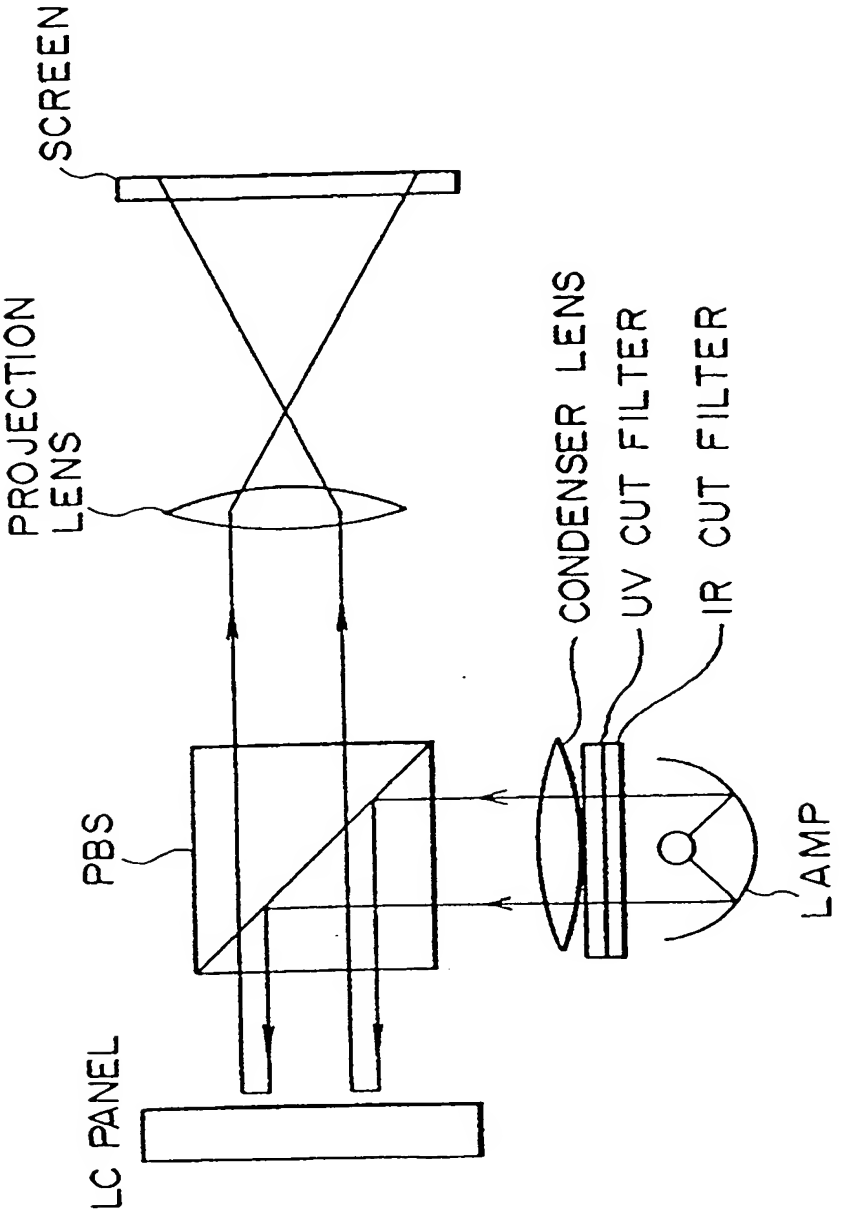

SCREEN
PROJECTION LENS
CONDENSER LENS
UV CUT FILTER
IR CUT FILTER
PBS
LAMP
LC PANEL

Fig.29

Fig.30
(Table 9)

No.	A※	B	C
SiO_2	24.9	24.9	24.9
Na_2O	0.9	0.9	0.9
K_2O	0.9	0.9	0.9
PbO	73.0	73.0	73.0
As_2O_3	——	0.3	——
Sb_2O_3	0.3	——	——
PHOTOELASTIC CONSTANT ($10^{-8}cm^2/N$)	0.22	0.22	0.23
WAVELENGTH CORR.TO TRANSMITTANCE OF 80%(nm)	393	396	424
INTERNAL TRANSMITTANCE AT 400nm	86	83	64

※This is the same as the optical glass No.23 indicated in Fig.26 (Table 7).

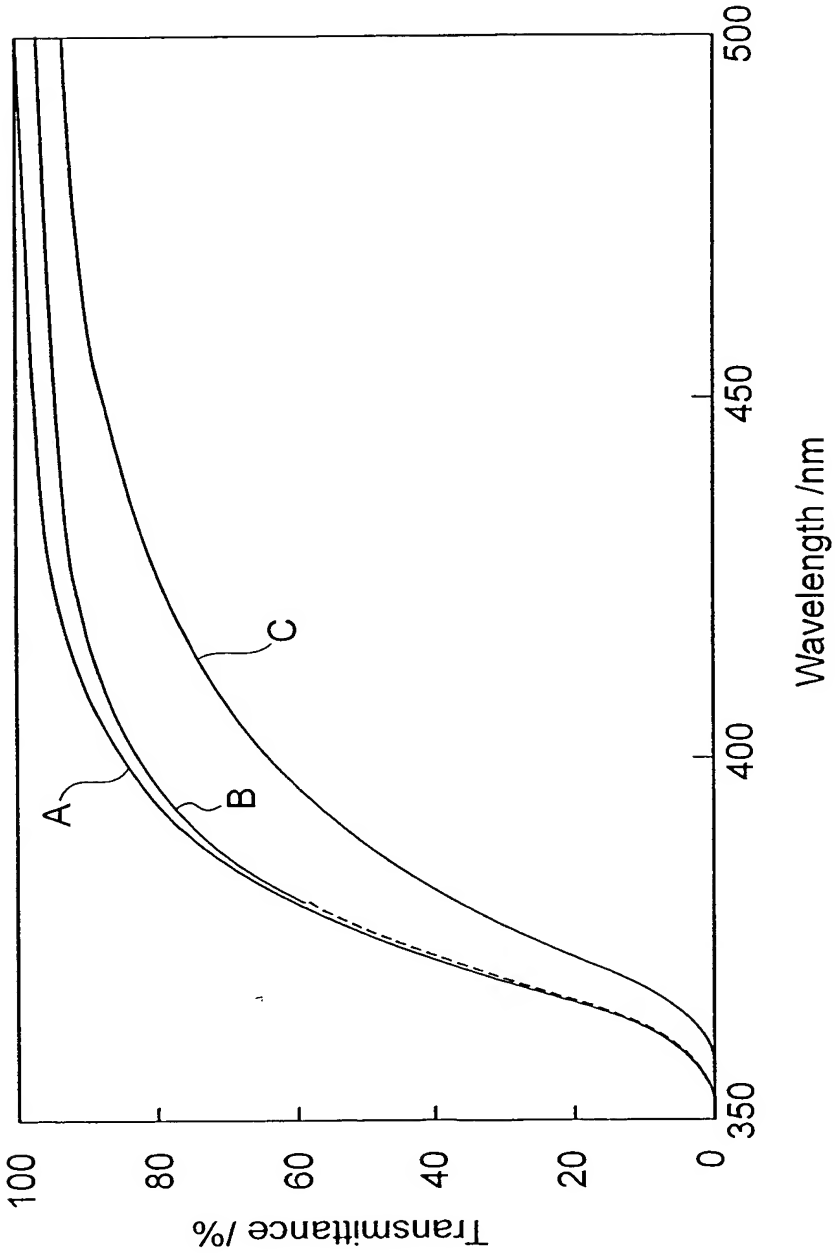

Transmittance /%
100
80
60
40
20
0
350
400
450
500
Wavelength /nm
A
B
C

Fig.31

Divisional of Application of No.: 0/368,892
Filed: October 26, 2001
Inventor: Ueda et al.
Title: OPTICAL GLASS FOR POLARIZING OPTICAL .....
Attorney Docket No.: 7954-0157

Fig.32
(Table 10)

Results of measurement of photoelastic constants

Glasses	Present * 1 invention	PDC6	BK7	DC5	LAC8	FC3
Manufacturer	Nikon	Nikon	Nikon	Nikon	Nikon	Nikon
Refractive index(nd)	1.837	1.5932	1.5168	1.5891	1.7130	1.4645
Abbe's number(ν d)	26.0	67.9	64.1	61.1	53.9	65.8
Photoelastic constant ($10^{-8}cm^2/N$)	0.01	0.52	2.85	2.29	1.98	4.09
Main * 2 components	$SiO_2 \cdot R_2O \cdot PbO \cdot PbF_2$	$P_2O_5 \cdot AlF_3 \cdot RF_2 \cdot XF_3$	$SiO_2 \cdot Al_2O_3 \cdot R_2O \cdot RO$	$SiO_2 \cdot B_2O_3 \cdot Al_2O_3 \cdot RO$	$B_2O_3 \cdot Al_2O_3 \cdot RO \cdot X_2O_3$	$SiO_2 \cdot B_2O_3 \cdot Al_2O_3 \cdot KF$
Glasses	FK5	SK16	F2	ZKN7	SF2	SF6
Manufacturer	Schott	Schott	Schott	Schott	Schott	Schott
Refractive index(nd)	1.4875	1.6204	1.6200	1.5085	1.6477	1.8052
Abbe's number(ν d)	70.4	60.3	36.4	61.2	33.9	25.4
Photoelastic constant ($10^{-8}cm^2/N$)	2.92	1.90	2.81	3.64	2.64	0.64

* 1:This is the same as the optical glass No.4 indicated in Fig.16 (Table 1).

* 2:"R" denotes an alkaline metal or an alkaline earth metal.
"X" denotes a rare earth metal.